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Action Memorandum for the Non-Time-Critical Removal Action for the 224-T Plutonium Concentration Facility

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management



**United States
Department of Energy**
P.O. Box 550
Richland, Washington 99352

**Approved for Public Release;
Further Dissemination Unlimited**

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J. D. Arrol 6/15/2005
Release Approval Date

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ACRONYMS

224-T Facility	224-T Plutonium Concentration Facility
ACM	asbestos-containing material
ARAR	applicable or relevant and appropriate requirement
CERCLA	<i>Comprehensive Environmental Response, Compensation and Liability Act of 1980</i>
CFR	Code of Federal Regulations
CWC	Central Waste Complex
D&D	decontamination and demolition
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ESD	Explanation of Significant Differences
ETF	200 Areas Effluent Treatment Facility
LLW	low-level waste
mrem/yr	millirem per year
NCP	National Contingency Plan
OMB	U.S. Office of Management and Budget
PCB	polychlorinated biphenyl
ppm	parts per million
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RCW	Revised Code of Washington
ROD	record of decision
S&M	surveillance and maintenance
SAP	sampling and analysis plan
TBC	to be considered
TRUSAF	224-T Transuranic Waste Storage and Assay Facility
TSCA	<i>Toxic Substances Control Act of 1976</i>
TSD	treatment, storage, and/or disposal
WAC	Washington Administrative Code
WIPP	Waste Isolation Pilot Plant

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ACTION MEMORANDUM FOR NON-TIME-CRITICAL REMOVAL ACTION FOR THE 224-T PLUTONIUM CONCENTRATION FACILITY

1.0 PURPOSE

This Action Memorandum documents approval of the proposed non-time-critical removal action described herein for the 224-T Plutonium Concentration Facility (224-T Facility), located on the Hanford Site, Richland, Washington. The 224-T Facility is located adjacent to the T Plant Complex in the 200 West Area, but is not within the T Plant Complex treatment, storage and/or disposal (TSD) boundary. Highway 240 is to the southwest of the T Plant Complex, and the Columbia River is north-northwest. The 224-T Facility is a deactivated plutonium concentration facility that formerly was associated with the T Plant Complex. In addition, a portion of the facility was later utilized as a *Resource Conservation and Recovery Act (RCRA) of 1976* TSD container storage unit known as the 224-T Transuranic Waste Storage and Assay Facility (TRUSAF).

This removal action minimizes the potential for a release of hazardous substances in the 224-T Facility that could adversely impact human health and the environment, is protective of site personnel, and minimizes disposal costs. Utilizing the *RCRA-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980* Integration process, the facility decontamination and demolition (D&D) is being executed as a non-time critical removal action under CERCLA authority. The Washington State Department of Ecology (Ecology) agrees that this may provide the most efficient means for addressing threats to human health and the environment from RCRA TSD units. The non-time critical removal action is part of the overall CERCLA response.

Ecology intends to use the results of the CERCLA response action to fulfill Ecology's delegated responsibility with respect to closure of the TRUSAF RCRA TSD unit. All containers have already been removed from TRUSAF, and to the best of Ecology's knowledge, no releases have occurred from the TSD. While closure of TRUSAF is being coordinated with this CERCLA response, Ecology's decision concerning approval of the TRUSAF Closure Plan will be made independent of this Action Memorandum and implementation of the Closure Plan is not a requirement of this Action Memorandum.

A 45-day public comment and review period was held from January 12, 2004 through February 26, 2004. All comments received generally supported implementation of this action. Revisions to the preferred alternative to strengthen post-removal sampling and verification activities resulted in part from public comments. The comments and responses are contained in the administrative record.

2.0 SITE CONDITIONS AND BACKGROUND

The 224-T Facility contains CERCLA hazardous substances, predominantly residual radionuclides, and residual quantities of hazardous chemicals. The integrity of the structure and internal systems has degraded, resulting in an increased potential for release of these hazardous substances to the environment. The U.S. Department of Energy (DOE) has determined that a non-time-critical removal action, pursuant to authority delegated under Executive Order 12580, is warranted to mitigate this threat for the 224-T Facility.

The 224-T Facility is currently an inactive surplus facility and is administered under a surveillance and maintenance (S&M) program while awaiting disposition. Because the TRUSAF operated as a RCRA

TSD container storage unit, the TRUSAF is subject to the TSD closure standards of RCRA as implemented through the Washington State Hazardous Waste Management Act.

2.1 BACKGROUND

The 224-T Facility was completed in 1944 and originally designated the 224-T Bulk Reduction Building. Its purpose was to concentrate the plutonium nitrate solution produced in the first major step in the plutonium recovery process conducted at the T Plant Complex. It operated in this capacity from January 16, 1945 until early 1956, when the T Plant Complex was retired from active service as a chemical processing facility.

The 224-T Facility was idle for several years before being modified in 1975 to meet the requirements for storing plutonium-bearing wastes. In 1985 a portion of the building became TRUSAF and operated in that capacity until the late 1990s.

These past operations resulted in contamination throughout portions of the structure.

2.2 FACILITY DESCRIPTION

The 224-T Facility is a small canyon building located in the 200 West Area next to T Plant. The 224-T Facility is a three-story, reinforced concrete structure containing 21 rooms (in its original configuration) and five process cells, with a large operating gallery located on the third floor. A sixth process cell was provided in 1950 to boost production. The first and second floors have outside dimensions of approximately 60 meters by 18.3 meters. The third floor is 44.2 meters by 18.3 meters. A 30-centimeter-thick concrete wall divides the building into two main sections. Offices and operating galleries were originally located on the northwest side of the dividing wall. The walls, floors, and ceiling are constructed of reinforced concrete. The process cells are located on the southeast side of the dividing wall and have been sealed from the northwest section for over 25 years.

The process cell portion of the building consists of six cells (A through F). Cells A through E are three stories, or 12.2 meters high and are separated from each other by concrete walls that are 4.5 meters high and 20 centimeters thick. Each cell is approximately 7.6 meters by 8.5 meters. Cells A, B, D, and E are similar in equipment (e.g., tanks) and configuration, except that the Cell B contains an additional tank. Also, in Cell C, approximately one-half of the cell is a deep pit containing tanks, where the floor of the pit is 5.8 meters below the first floor level. There are ground level personnel access doors into each of the five cells on the southeast side of the building. In addition, there is a 3.7-meter by 3.7-meter high equipment access door located at the second floor level outside of E Cell.

A manually operated 8-ton bridge crane is installed over the cells. The rails run the length of Cells A through E, allowing access to each of the cells. The internal rails of the bridge crane are aligned with external rails that pass through the equipment access door, allowing the crane to move equipment into and out of the building. The crane was operated from a walkway that extends around the outside of the cells at the second-floor level. The crane is without power and is now deactivated. A 1.8-meter high wall shields the walkway from the cells, and access doors to the walkway are located at both ends of the A through E pipe gallery.

Cell F is 7.5 meters by 7.6 meters by 7.6 meters high and is separated from the other cells by a concrete wall. Modifications completed in the 1970s reduced the size of Cell F to approximately 50% of its original size with the installation of steel barrier walls. Access to the Cell F mezzanine is gained via an external staircase and door in the TRUSAF area. There are two additional points of access to Cell F: one

is an exterior door on the southwest side of the building and the other is through a door in the TRUSAF receiving area.

The F-10 Loadout Hood is located on the ground floor in the southwest end of the building in the TRUSAF area and contains a small slab tank.

The 224-T Facility exhaust ventilation system is not in service, and the stack has been capped. Vessel ventilation of the 224-T tanks and centrifuges is provided by the T Plant Complex main exhaust system (the vacuum created by the 291-T fans). Air in-leakage provides the supply air to the process cells. Stainless steel sub-headers, connected to the tanks and centrifuges inside the cells, exit the southwest side of the building above grade. The stainless steel headers are directed down and transition to clay pipe below ground level. The clay pipes connect to a clay main header below grade. The line connects to the T Plant Complex main exhaust tunnel at the west-end of the 221-T building. In areas where the original soil cover was less than 1.2 meters or greater than 2.1 meters deep, the clay pipe is protected by a reinforced concrete encasement.

The service and aqueous make-up piping entered the building at the east-end. The aqueous make-up chemicals (originating from 271-T) and steam piping entered the building through overhead lines. The sanitary water below grade connection at the northeast end of the 224-T Facility has been isolated.

The 224-T Facility internal cell drainage system collects wastewater in the C-9 tank in the deep portion of Cell C. A gutter along the base of the northeast wall in Cell A to Cell F drains to a clay pipe laid below the cell floors. The operating decks, where the centrifuges are located, in Cells A, B, D, and E also drain to Cell C. Because there are no active pumps to transfer liquids, accumulated liquids could overflow the tank and collect in the pit.

2.3 RELEASES OR THREATENED RELEASE INTO THE ENVIRONMENT OF A HAZARDOUS SUBSTANCE OR POLLUTANT OR CONTAMINANT

The 224-T Facility is contaminated with hazardous substances used or generated during plutonium concentration operations and/or the operation of TRUSAF. The TRUSAF began storing transuranic and transuranic-mixed wastes from DOE offsite and onsite generators in 1985. The TRUSAF provided a central location for interim storage of newly generated and retrieved transuranic waste. Administrative waste processing in TRUSAF included inspection of containers and associated documentation, examination with a real-time radiography system to confirm the absence of prohibited items, and neutron assay of the waste containers to confirm fissile isotope content. The TRUSAF operations ended prior to receipt of the building by the responsible S&M organization in 2000. The cells in the process areas were sealed and isolated from the operating gallery and services areas of the building, and the service areas were stripped of all unnecessary control equipment. Panel boards and partitions were removed to provide 1,068 meters² of storage space on three floors.

To help identify hazardous substances, several sources of information were used, including characterization data, historical operations, process knowledge, and knowledge of the construction materials. Key radionuclide contaminants are transuranics, including plutonium-239 and americium-241 and mixed fission products such as strontium-90 and cesium-137. The majority of contaminants are found in the form of adherent films and residues encrusted in deactivated process vessels, piping, and ventilation system ductwork.

The results of this effort (PNNL 2002a and 2002b) are summarized in Table 2-1.

Table 2-1. 224-T Facility Plutonium/Americium Inventory Mass by Location.

Location	Pu-238 (g)	Pu-239 (g)	Pu-240 (g)	Pu-241 (g)	Pu-242 (g)	Am-241 (g)
Cell A	1.20E-03	8.10E+00	5.27E-01	3.09E-03	2.60E-03	4.43E-01
Cell B	1.44E-03	9.72E+00	6.33E-01	3.72E-03	3.12E-03	1.44E+00
Cell C ¹	1.33E-03	8.96E+00	5.84E-01	3.42E-03	2.88E-03	6.39E-02
Cell D	1.39E-04	9.37E-01	6.10E-02	3.58E-04	3.01E-04	7.08E-02
Cell E	4.75E-04	3.21E+00	2.09E-01	1.23E-03	1.03E-03	4.68E-01
Cell F ²	2.38E-03	1.61E+01	1.05E+00	6.15E-03	5.17E-03	2.60E+00
F-10	1.52E-03	1.03E+01	6.71E-01	3.94E-03	3.31E-03	3.32E-01
Total	8.48E-03	5.73E+01	3.73E+00	2.19E-02	1.84E-02	5.42E+00

¹Includes estimated inventory for submerged tanks.²Not including F-10.

The primary hazardous materials of concern are radioactive materials. All known quantities of concentrated hazardous chemicals have been removed from the facility during deactivation and S&M operations. Some residual quantities of hazardous chemicals might remain as hold up or heels in process lines, tanks, and vessels. In addition, the 224-T Facility is anticipated to contain one or more of the following hazardous materials found in most Hanford Site facilities:

- Polychlorinated biphenyls (PCB) and non-PCB light ballasts
- Lead paint
- Lead for shielding
- Mercury switches, gauges, thermometers
- Mercury or sodium vapor lights
- Used oil from motors and pumps
- Unspecified chemical containers
- Friable and nonfriable forms of asbestos.

Specific chemicals that were used during or as part of the plutonium concentration process are listed in Table 2-2.

Table 2-2. Suspected Nonradiological Contaminants in the 224-T Facility.

Input Chemicals	
BiPO ₄	Bismuth phosphate
NaBiO ₃	Sodium metabismuthate
Na ₂ Cr ₂ O ₇ •2H ₂ O	Sodium chromate
H ₃ PO ₄	Phosphoric acid
HNO ₃	Nitric acid
La(NO ₃) ₃ •2NH ₄ NO ₃ •4H ₂ O	Lanthanum ammonium nitrate
H ₂ C ₂ O ₄ •2H ₂ O	Oxalic acid
HF	Hydrogen fluoride
KOH	Potassium hydroxide
KMnO ₄	Potassium permanganate
Waste Solutions	
BiPO ₄	Bismuth phosphate
HNO ₃	Nitric acid
LaF ₃	Lanthanum fluoride
KOH	Potassium hydroxide
H ₃ PO ₄	Phosphoric acid
NaNO ₃	Sodium nitrate
KNO ₃	Potassium nitrate
Cr(NO ₃) ₃	Chromium nitrate
HF	Hydrogen fluoride
H ₂ C ₂ O ₄ •2H ₂ O	Oxalic acid
Mn(NO ₃) ₂	Manganese nitrate
NH ₄ NO ₃	Ammonium nitrate
KF	Potassium fluoride

Additional characterization will be conducted as part of the removal action activities in accordance with an approved sampling and analysis plan. The additional sampling and characterization will be used to support waste designation and to determine if the removal action objectives and stabilization requirements have been met.

2.4 DISCUSSION OF RELEASE THREAT

The 224-T Facility is contaminated with hazardous substances, primarily a significant inventory of radionuclides (Table 2-1).

The risks to the public and the environment associated with routine S&M activities at the 224-T Facility are not quantified. However, cell radiological conditions require special precautions for entry.

The CP-14641, *224-T Facility Documented Safety Analysis*, (2002) Beyond Design basis accident scenario indicates that should a seismic event occur significant enough to destroy the 224-T Facility, the calculated dose consequences are:

The calculated dose at 100 m is 2.3 rem.

The calculated dose at the Columbia River (13.1 km away) is 1.8E-03 rem.

The inhalation and ingestion pathways also are of concern if the material within the cell processing equipment and piping is disturbed. During canyon cell area D&D activities, the potential for radiological

doses to personnel and the environment is considered to be a significant risk. D&D activities include process cell equipment dismantling (cutting process piping). Even though personal protective equipment will be worn, external radionuclides exposure and inhalation will still pose a risk. During initial D&D activities, the potential for a radionuclide release will increase. As the inventory is stabilized and disposed appropriately, the risk will decrease.

In general, the risk of an accidental radiological release (e.g., from a structural failure resulting from seismic event) increases the longer the facility remains in the S&M Program awaiting disposition. The risk from the 224-T Facility will increase with time because of the potential for inventory releases from structure degradation. The external radiation, inhalation, and ingestion risks associated with the contamination threat of release to the environment under a continued S&M scenario justify a non-time-critical removal action.

2.5 OTHER ACTIONS TO DATE

D&D activities have not been undertaken for the 224-T Facility since operation ceased in the 1990s. Additional selective decontamination activities might be performed before initiating work covered by this removal action scope. If implemented, these activities would focus on removing additional radioactive material and/or chemical waste to reduce the risk to personnel and the environment during D&D. Any waste generated will be managed appropriately. The facility is currently in the surveillance and maintenance mode.

3.0 THREATS TO HUMAN HEALTH OR THE ENVIRONMENT

Conditions persist wherein threats to the public health or the environment exist.

The National Contingency Plan (NCP), 40 Code of Federal Regulations (CFR), Section 300.415(b)(2), establishes factors to be considered in determining the appropriateness of a removal action. Those factors include:

- *Hazardous substances or pollutants or contamination in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release.* Hazardous substances, including radioactive substances are contained within the 224-T Facility's pipes and process vessels. These substances pose a threat of accidental release that may result from equipment failure resulting from a fire or seismic event.
- *Other situations or factors are present that may pose threats to public health or the environment.* Hazardous substances are present as fixed contamination within the cells, equipment and additional structures. These substances pose a threat of release as fixed contamination becomes exposed and as structural integrity is compromised, resulting in a potential direct exposure of nearby personnel and the environment, and exposure to the public through airborne radioactive contaminants. The S&M activities required to maintain confinement of the structures increasingly pose a potential exposure to the environment.

4.0 ENDANGERMENT DETERMINATION

DOE will utilize CERCLA response authority whenever a hazardous substance is released, or there is a substantial threat of release, into the environment, and response is necessary to protect public health,

welfare, or the environment. DOE Order 5400.4 requires DOE to respond to any release or substantial threat of a release of a hazardous substance into the environment in a manner consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan, regardless of whether or not the release or threatened release is from a site listed on the National Priorities List.

The response action proposed is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, including radioactive substances from the 224-T Facility into the environment. Such a release or threat of release may present an imminent and substantial endangerment to public health, welfare, or the environment.

5.0 PROPOSED ACTIONS AND ESTIMATED COSTS

Proposed action and estimated costs are presented in the following sections.

5.1 PROPOSED ACTION

An engineering evaluation/cost analysis (EE/CA) (DOE/RL-2003-62) was prepared to develop removal action alternatives for the 224-T Facility. The removal action alternatives evaluated for the 224-T Facility must meet the removal action objectives. The specific removal action objectives for this response action are as follows:

- Reduce or eliminate the potential for exposure to hazardous substances above levels that are protective of the public and environment
- Reduce or eliminate the potential for a release of hazardous substances
- Safely manage (treat and/or dispose) waste streams generated by the removal action
- To the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action with respect to the release concerns and ensure an orderly transition from removal to remedial response actions, including any future subsurface soil remediation.

Based on these considerations, the following four removal action alternatives are identified:

- Alternative One: No Action
- Alternative Two: Continued S&M
- Alternative Three: D&D (to grade, excluding building foundation and underlying soils/structures)
- Alternative Four: D&D (including building foundation and underlying soils/structures to 1 meter below foundation). NOTE: The foundation includes the footings of the structure.

5.1.1 Alternative One: No Action

Under the No Action alternative, access to the 224-T Facility is assumed to be unrestricted. Industrial and radiological hazards continue to exist because controls to prevent access are not maintained. Initial risks

of the No Action alternative are minimal to the environment provided there are no significant seismic, weather, or fire events. Risks over time are expected to increase as deterioration of the 224-T Facility progresses and structural integrity is compromised. The No Action alternative does not address the hazards posed by the 224-T Facility as it continues to deteriorate. Eventually, decay is expected to result in radiological or other hazardous substance releases to the environment and potential exposure to personnel and the public. Physical hazards associated with partial structural collapse also would be anticipated.

5.1.2 Alternative Two: Continued S&M

Under the Continued S&M Alternative, the 224-T Facility would remain in the S&M program until decommissioning occurs. The 224-T Facility would be maintained in a quiescent state for a considerable duration while ongoing preventive measures are implemented. These measures would include periodic radiological and industrial hazard monitoring (both inside and outside of the 224-T Facility), cold weather protection, preventive maintenance, annual roof inspections, identification and minor repair of friable asbestos, and general visual inspections. Major maintenance operations, such as roof maintenance, would be performed to ensure the maintenance of safe conditions and the control of the ongoing deterioration process. Additionally, limited decontamination and fixative application would occur to control the spread of radiological contamination.

The primary goal of this alternative is to prevent radiological environmental releases and to avoid industrial accidents. Adoption of the S&M alternative would extend the life of the 224-T Facility for approximately the next 30 years, during which time deterioration would progress and unusual events (e.g., seismic) might occur. Severe weather conditions could create conditions amenable to radiological releases, and long-term aging of confinement structures could lead to eventual failure. These conditions, accompanied by minimum surveillance efforts, could result in an unplanned radiological release.

Because minimal surveillance readily does not detect 224-T Facility decay (e.g., system corrosion or structural breakdown), preventive maintenance might not occur in time, and response actions could be required. This approach could result in the spread of contamination. An ongoing S&M program would have to become increasingly more labor intensive and incorporates periodic characterization efforts to counter these conditions. Such conditions would ultimately lead to increased risk of exposure of radioactive material and contamination to personnel and the environment.

5.1.3 Alternative Three: D&D (To Grade, Excluding Building Foundation and Underlying Soils/Structures)

This D&D alternative consists of removing the nonradiological and radiological hazardous substances from the 224-T Facility, removing equipment and associated piping, decontaminating the structure and/or stabilizing the contamination, demolishing the structure to slab, disposing of the waste generated, and stabilizing the area.

Hazardous substances, primarily on the gallery side, would be removed. These substances include asbestos-containing material (ACM), the chemical feed tanks and piping, equipment oil, mercury, control panels, and potentially materials/liquids in the floor drains. Radiological hazardous substances removal includes removal of the loadout hood on the west end of the first floor (cell F) and all of the canyon cell tanks and piping. Because most of the radioactive inventory exists within the process cell equipment and piping, the process cell equipment and piping would be removed completely and disposed as appropriate, either before or as part of the demolition. Equipment, vessels, and piping might need to be cut to facilitate removal and/or disposal. Remote handling equipment and an upgraded canyon bridge crane

could be used to facilitate removal of cell equipment and piping. The door on the south side on the second floor, adjacent to cell E, could be used during D&D for material removal.

In general, piping and vessels would be removed, either before or as part of demolition. Piping and drains entering or exiting belowgrade would be plugged or grouted to prevent potential pathways to the environment.

The majority of the demolition would require the use of heavy equipment (e.g., excavator with various attachments) to demolish the structure. Other industry standard practices for demolition also could be used (e.g., mechanical saws and cutting torches). The 224-T Facility would be demolished to grade, with only a slab remaining. Areas such as the pipe tunnel area in cell C that exist belowgrade would be filled with grout, gravel, or other suitable material to grade level and the entire footprint of the 224-T Facility would be stabilized to prevent migration of any residual contamination to the environment.

The scope of this removal action does not include soil, groundwater, or waste site remediation. Further soil or waste site remediation would be conducted in coordination with future remedial actions.

The major risks associated with this D&D alternative are the safety of personnel involved in both the radiological aspects of the process system removal and decontamination and the industrial aspects of facility demolition/dismantlement. These risks are related to the potential release of contamination during operations and the hazards associated with D&D activities. Risks associated with credible natural phenomenon events (e.g., seismic actions and high-velocity wind) would continue to exist until the radioactive material inventory is removed. These risks would diminish as the 224-T Facility removal activities progress and the radiological inventory is removed.

The disposal of the radioactive material inventory in the 224-T Facility and the immediate removal of the 224-T Facility and systems are the most direct resolution of impending radiological and physical hazards. By backfilling over any potential below-grade area of the 224-T Facility and stabilizing the slab, the mobility of residual contaminants to the environment in and under the foundation would be significantly reduced. In time, however, contaminants could still pose a risk through groundwater transport exposure pathways or by inadvertent intrusion. Therefore, further action, including a possible remedial action might be required. While concerns for operational methods and technology used would be encountered and resolved during the removal action, no major issues exist that might compromise this alternative.

5.1.4 Alternative Four: D&D (Including Building Foundation and Underlying Soils/Structures to 1 Meter Below Foundation)

This alternative consists of D&D as described in Alternative Three plus the removal of the building foundation to a depth of 1 meter below the foundation and footings. In this alternative, the potentially contaminated facility foundation, piping, drains, and surrounding soil would be removed to 1 meter below the foundation and 1 meter out from the building footprint. The resulting void space would be backfilled with clean fill.

The demolition would use heavy equipment (e.g., excavator with various attachments) to demolish the structure. Other industry standard practices for demolition also could be used (e.g., mechanical saws). Removal would include the abovegrade structure and subsurface structure and systems to a depth of 1 meter below the foundation.

Underground piping and trenches extending away from the 224-T Facility are included only in the scope to a distance of 1 meter from the walls of the structure, although additional piping or trenches might be removed and disposed as necessary to accommodate the removal action for the structure. Contaminated

and uncontaminated soil to a distance of 1 meter from the walls and floors of the structure might be moved or removed as necessary to implement the removal of the structures; however, the scope of this removal action does not include any additional soil, groundwater, or waste site remediation beyond that described above.

The major risks associated with this alternative are the safety of personnel involved in both the radiological aspects of the process system removal and decontamination and the industrial aspects of facility demolition and dismantlement, which includes soil excavation. These risks are related to the potential release of contamination during operations and the hazards associated with construction activities. Risks associated with credible natural phenomenon events (e.g., seismic actions and high-velocity wind) would continue to exist until the radioactive material inventory is removed. These risks would diminish as the 224-T Facility removal progresses and the radioactive inventory is removed.

The disposal of the radioactive material inventory in the 224-T Facility and the immediate removal of the facility and systems are the most direct resolution to impending radiological and physical hazards. Because the foundation of the structure, as well as underlying and adjacent soils, would be removed to the extent described, this alternative results in the removal of the greatest amount of contamination of the four removal action alternatives. In time, however, potential contaminants remaining in the soil, piping, or trenches could still pose a risk through the groundwater transport exposure pathway or by inadvertent intrusion, and may need to be remediated as part of future remedial actions. While concerns for operational methods and technology utilization would be encountered and resolved during the removal action, no major issues exist that might compromise this alternative.

5.2 COMMON ELEMENTS

With the exception of the No Action alternative, each of the alternatives would result in generation of waste (S&M to a lesser extent). The majority of the contaminated debris likely would be designated as low-level waste (LLW); however, quantities of transuranic waste, mixed waste, dangerous waste, and solid waste not contaminated with hazardous substances may be generated. Waste management applicable or relevant and appropriate requirements (ARARs) are discussed in Section 5.3.1.

Waste generated under removal action Alternatives Two, Three, and Four would be disposed at an appropriate disposal site. Waste management would be a common element among these alternatives. For each alternative, recycling and/or reuse options would be evaluated and implemented where possible to reduce the volume of material disposed.

Contaminated waste for which no reuse, recycle, or decontamination option is identified would be assigned an appropriate waste designation (e.g., solid, asbestos, PCB, radioactive, dangerous, or mixed) and disposed of at an approved disposal location. For the purposes of the cost analysis performed in this document, most of the contaminated waste generated during implementation of these alternatives is assumed to be disposed onsite at the Environmental Restoration Disposal Facility (ERDF) in the 200 West Area. Alternate potential disposal locations may be considered when the removal action is performed if a suitable and cost effective location is identified. Alternate potential disposal locations will be evaluated using appropriate performance standards to assure that they are adequately protective of human health and the environment and contribute to efficient performance of possible remedial actions.

ERDF is an engineered facility that provides a high degree of protection to human health and the environment and meets RCRA minimum technical requirements for landfills, including standards for a double liner, a leachate collection system, leak detection, and monitoring. Construction and operation of ERDF was authorized using a separate CERCLA record of decision (ROD) (EPA et al. 1995). The *U.S. Department of Energy Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton*

County, Washington, Explanation of Significant Differences (ESD) (EPA et al. 1996) modified the ERDF ROD (EPA et al. 1995 and 2002) to clarify the eligibility of waste generated during cleanup of the Hanford Site. Per the ESD, ERDF is eligible for disposal of any LLW, mixed waste, and hazardous/dangerous waste generated as a result of cleanup actions (e.g., D&D waste and investigation-derived waste), provided that the waste meets ERDF waste acceptance criteria and that appropriate CERCLA decision documents are in place.

The waste that would be generated under these alternative CERCLA removal actions would fall within the definition of waste eligible for disposal at ERDF established in the ERDF ROD and subsequent ESD. Some waste may require treatment to meet ERDF waste acceptance criteria or RCRA land disposal restrictions. The type and location of treatment would be documented in treatment plans developed as needed for each waste stream requiring treatment. Solidification, encapsulation, neutralization, and size reduction/compaction could be employed to treat various waste types.

If other suitable locations for disposal of wastes are identified prior to the completion of implementation of the selected alternative (e.g. rubble from the demolished structure used as fill for nearby remedial actions), the alternate waste disposal location would be evaluated in accordance with the Removal Action Objectives and the selected ARARs, and the waste management plan would be modified as appropriate.

While most waste that would be generated during the proposed removal action alternatives likely would meet ERDF waste acceptance criteria, some waste might not meet or might not be able to be treated to meet ERDF acceptance criteria. Specifically, this would include low-level radioactive and nonradioactive liquid waste that might be encountered or generated. Liquid waste containing levels of radioactive and/or nonradioactive hazardous substances meeting the 200 Areas Effluent Treatment Facility (ETF) waste acceptance criteria would be transferred to ETF and treated to meet ETF waste discharge criteria. Liquids that do not meet ETF waste acceptance criteria would be solidified and either disposed at ERDF (if ERDF waste acceptance criteria are met) or stored at the Central Waste Complex (CWC) subject to final disposition under CERCLA. Clean water (e.g., nonradioactive and nonhazardous) could be used for dust suppression.

In the event that transuranic wastes are generated, they would be placed in interim storage at CWC and shipped offsite to the Waste Isolation Pilot Plant (WIPP) in accordance with the schedule established for completing remedial actions, no later than September 30, 2024.

ERDF is considered to be onsite for management and/or disposal of waste from the removal action proposed in this document¹. There is no requirement to obtain a permit to manage or dispose of CERCLA waste at the ERDF. It is expected that the great majority of the waste generated during the removal action proposed in this document can be disposed onsite at ERDF. For waste that must be sent offsite, EPA would make a determination in accordance with 40 CFR 300.440 as to the acceptability of the proposed disposal site for receiving this CERCLA removal action waste. For this removal action, CWC and ETF are considered 'offsite'.

¹ CERCLA Section 104(d)(4) states that, where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the President may, at his discretion, treat these facilities as one for the purpose of this section. The preamble to the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR 300) clarifies the stated EPA interpretation that when noncontiguous facilities are reasonably close to one another, and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. Therefore, the ERDF is considered to be onsite for response purposes under this removal action. It should be noted that the scope of work covered in this removal action is for a facility and waste contaminated with hazardous substances. Materials encountered during implementation of the selected removal action that are not contaminated with hazardous substances will be dispositioned by DOE.

5.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND OTHER CRITERIA, ADVISORIES, OR GUIDANCE TO BE CONSIDERED

A requirement under other environmental laws may be either "applicable" or "relevant and appropriate," but not both. Identification of ARARs must be done on a site-specific basis and involves a two-part analysis: first, a determination whether a given requirement is applicable; then, if it is not applicable, a determination whether it is nevertheless both relevant and appropriate.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

To Be Considered (TBC) information consists of nonpromulgated advisories or guidance issued by federal or state governments that are not binding legally and do not have the status of ARARs. As appropriate, TBCs should be considered in determining the removal action necessary for protection of human health and the environment. Requirements drawn from TBCs may be included in the selected alternative. Because the alternatives would result primarily in waste generation and potential for air emissions, the key ARARs identified for the alternatives considered include waste management standards; standards controlling emissions to the environment; and environment, safety, and health standards. The ARARs are discussed generally in the following sections and are documented in detail in Table 5-1.

5.2.1 Waste Management Standards

A variety of waste streams would be generated under the proposed removal action alternatives. It is anticipated that most of the waste will designate as LLW. However, quantities of transuranic, dangerous or mixed waste, PCB-contaminated waste, and asbestos and ACM also could be generated. The great majority of the waste will be in a solid form. However, some aqueous solutions might be generated.

The identification, storage, treatment, and disposal of hazardous waste and the hazardous component of mixed waste are governed by RCRA. The State of Washington, which implements RCRA requirements under *Washington Administrative Code* (WAC) 173-303, has been authorized to implement most elements of the RCRA program. The dangerous waste standards for generation and storage would apply to the management of any dangerous or mixed waste generated at the 224-T Facility. Treatment standards for dangerous or mixed waste subject to RCRA land disposal restrictions are specified in WAC 173-303-140, which incorporates 40 CFR 268 by reference.

The management and disposal of PCB wastes are governed by the *Toxic Substances Control Act* (TSCA) of 1976, and regulations at 40 CFR 761. The TSCA regulations contain specific provisions for PCB waste, including PCB waste that contains a radioactive component. PCBs also are considered underlying hazardous constituents under RCRA and thus could be subject to WAC 173-303 and 40 CFR 268 requirements.

Removal and disposal of asbestos and ACM are regulated under the *Clean Air Act* (40 CFR 61, Subpart M) and Occupational Safety and Health Administration regulations (29 CFR 1910.1101 and WAC 296-62). These regulations provide for special precautions to prevent environmental releases or exposure to personnel of airborne emissions of asbestos fibers during removal actions. 40 CFR 61.52 identifies packaging requirements.

Waste that is designated as LLW that meets ERDF acceptance criteria is assumed to be disposed at ERDF, which is engineered to meet appropriate performance standards under 10 CFR 61. Alternate potential disposal locations may be considered when the removal action occurs if a suitable and cost effective location is identified. Any potential alternate disposal location will be evaluated and submitted for EPA approval.

Waste designated as dangerous or mixed waste would be treated as appropriate to meet land disposal restrictions and ERDF acceptance criteria, and disposed at ERDF. ERDF is engineered to meet minimum technical requirements for landfills under WAC 173-303-665. Applicable packaging and pre-transportation requirements for dangerous or mixed waste generated at the 224-T Facility would be identified and implemented before movement of any waste.

Some of the aqueous waste designated as LLW, dangerous, or mixed waste would be transported to ETF for treatment and disposal. ETF is a RCRA-permitted facility authorized to treat aqueous waste streams generated on the Hanford Site and dispose of these streams at a designated state-approved land disposal facility in accordance with applicable requirements.

Waste designated as PCB remediation waste likely would be disposed at ERDF, depending on whether it is LLW and meets the waste acceptance criteria and substantive TSCA disposal requirements. PCB waste that does not meet ERDF waste acceptance criteria would be retained at a PCB storage area meeting the requirements for TSCA storage and would be transported for future treatment and disposal at an appropriate disposal facility.

Asbestos and ACM would be removed, packaged as appropriate, and disposed in ERDF in accordance with 40 CFR 61.150.

All alternatives will be performed in compliance with the waste management ARARs. Waste streams will be evaluated, designated, and managed in compliance with the ARAR requirements. Before disposal, waste will be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel.

5.2.2 Standards Controlling Emissions to the Environment

The federal Clean Air Act of 1990 and Amendments (42 United States Code 7401 et seq.), and the Washington Clean Air Act (RCW 70.94) require regulation of air pollutants. Under federal implementing regulations, the Title 40 CFR Part 61, Subpart H requires that radionuclide airborne emissions from the facility shall be controlled so as not to exceed amounts that would cause an exposure to any member of the public of greater than 10 millirem per year effective dose equivalent. The same regulation addresses point sources (i.e., stacks or vents) emitting radioactive airborne emissions, requiring monitoring of such sources with a major potential for radioactive airborne emissions, and requiring periodic confirmatory measurement sufficient to verify low emissions from such sources with a minor potential for emissions. Under state implementing regulations, the federal regulations are paralleled by adoption, and in addition require added control of radioactive airborne emissions where economically and technologically feasible [WAC 246-247-040(3) and -040(4) and associated definitions].

In order to address the substantive aspect of these requirements, best or reasonable control technology will be addressed by ensuring that applicable emission control technologies (those reasonably operated in similar applications) will be utilized when economically and technologically feasible (i.e., based upon cost/benefit). Additionally, the substantive aspect of the requirements for monitoring of fugitive or non-point sources emitting radioactive airborne emissions [WAC 246-247-075(8)] will be addressed by sampling the effluent streams and/or ambient air as appropriate using reasonable and effective methods.

The federal implementing regulations also contain requirements for managing asbestos material associated with demolition and waste disposal (40 CFR 61, Subpart M).

The specific requirements pertaining to radioactive and nonradioactive air emissions for this action are in Table 5-1.

Table 5-1. Identification of Applicable or Relevant and Appropriate Requirements and To Be Considered Information for the 224-T Facility.

ARAR citation	ARAR or TBC	Requirement	Rationale for use
5.1.2.1 WASTE MANAGEMENT STANDARDS			
Regulations pursuant to the RCRA, 42 <i>United States Code</i> (USC) 6901, et seq. – Implemented through the <i>Hazardous Waste Management Act</i> , RCW 70.105			
<i>Dangerous Waste Regulations</i> , (WAC 173-303):			
Solid Waste Identification Specific subsections: WAC 173-303-016 WAC 173-303-017	ARAR	These regulations define how to identify when materials are and are not solid waste	These regulations are applicable because materials will be generated and they define how to determine which materials are subject to the designation regulations.
Dangerous/Mixed Waste Designation Specific subsections: WAC 173-303-070 WAC 173-303-071 WAC 173-303-080 WAC 173-303-081 WAC 173-303-082 WAC 173-303-090 WAC 173-303-100 WAC 173-303-110	ARAR	These regulations define the procedures to be used to determine if solid waste requires management as dangerous waste. The regulations identify which waste codes are appropriate for application to the waste.	These regulations are applicable to solid waste that will be generated during the removal action.
Dangerous/Mixed Waste Management Specific subsections: WAC 173-303-073 WAC 173-303-077 WAC 173-303-170(3)	ARAR	These regulations establish the management standards for solid waste designated as dangerous or mixed waste. Special waste is addressed in WAC 173-303-073. Universal waste is addressed in WAC 173-303-077. Generator standards are addressed in -170 and -200.	These regulations are applicable to the management of materials subject to WAC 173-303. Specifically, the standards for management of special waste and universal waste and the standards for management of dangerous/mixed waste are applicable to the onsite management of certain waste that will be generated during the removal action. WAC 173-303-170(3) includes the provisions of WAC 173-303-200 by reference. WAC 173-303-200 further includes certain standards from WAC 173-303-630 and -640 by reference.

Table 5-1. Identification of Applicable or Relevant and Appropriate Requirements and To Be Considered Information for the 224-T Facility.

ARAR citation	ARAR or TBC	Requirement	Rationale for use
Dangerous/Mixed Waste Disposal Specific subsections: WAC 173-303-140	ARAR	This regulation establishes state standards for land disposal of dangerous waste and incorporates by reference federal land disposal restrictions of 40 CFR 268 that are applicable to solid waste that designates as dangerous or mixed waste in accordance with WAC 173-303-070.	This regulation is applicable to dangerous/mixed waste generated from the removal action that will be destined for storage or land disposal
Recycling Requirements Specific subsections: WAC 173-303-120(3) WAC 173-303-120(5)	ARAR	These regulations define the requirements for the recycling of materials that are solid and a dangerous waste. Specifically, WAC 173-303-120(3) provides for management of certain recyclable materials, including spent refrigerants, antifreeze, and lead-acid batteries. WAC 173-303-120(5) provides for the recycling of used oil.	These regulations are applicable for the onsite management of materials, such as antifreeze and used oil that will be generated during removal action. Such materials can be recycled and/or conditionally excluded from certain dangerous waste requirements.
Final Treatment, Storage, and Disposal (TSD) Facility Requirements Specific subsection: WAC 173-303-610	ARAR	This regulation establishes requirements applicable to final status facilities undergoing closure.	This regulation would be applicable to any RCRA TSD unit undergoing closure pursuant to final status regulations, in conjunction with the removal action. This regulation would be relevant and appropriate to any TSD unit undergoing closure pursuant to interim status regulations, in conjunction with the removal action.
Regulations pursuant to the <i>Toxic Substances Control Act (TSCA)</i> , 15 USC 2601 et seq			
<i>Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce, and Use Provisions (40 CFR 761)</i>			
PCB Waste Management and Disposal Specific subsections: 40 CFR 761.50(b)(1) 40 CFR 761.50(b)(2) 40 CFR 761.50(b)(3) 40 CFR 761.50(b)(4) 40 CFR 761.50(b)(7) 40 CFR 761.50(c)	ARAR		These regulations are applicable to the onsite storage and disposal of PCB liquids, items, remediation waste, and bulk product waste at >50 parts per million. The specific identified subsections from 40 CFR 761.50(t) reference the specific sections for management of each PCB waste type. Radioactive PCB waste can be disposed in accordance with the substantive requirements of 40 CFR 761.50(b)(7).

Table 5-1. Identification of Applicable or Relevant and Appropriate Requirements and To Be Considered Information for the 224-T Facility.

ARAR citation	ARAR or TBC	Requirement	Rationale for use
Regulations pursuant to the <i>Solid Waste Management, Recovery and Recycling Act</i> , RCW 70.95			
<i>"Minimum Functional Standards for Solid Waste Handling,"</i> (WAC 173-304)			
Nondangerous, Nonradioactive Solid Waste Management Specific subsections: WAC 173-304-190 WAC 173-304-200	ARAR	These regulations establish requirements for the management of solid waste that is not dangerous or radioactive waste. Affected solid waste includes garbage, industrial waste, construction waste, and ashes. Requirements for containerized storage, collection, transportation, treatment, and disposal of solid waste are included.	These regulations are applicable to onsite management and disposal of nondangerous, nonradioactive solid waste that could be generated during removal action.
On-Site Containerized Storage, Collection and Transportation Standards for Solid Waste, WAC 173-304-200(2)	ARAR	Establishes the requirements for the onsite storage of solid wastes that are nonradioactive or dangerous wastes.	Substantive requirements of these regulations are applicable to materials encountered during the removal action. Specifically, nondangerous, nonradioactive solid wastes (i.e., hazardous substances that are only regulated as solid waste) that will be containerized for removal from the CERCLA site would be managed onsite according to the substantive requirements of this standard
<i>"Solid Waste Handling Standards,"</i> (WAC 173-350)			
On-Site Storage, Collection and Transportation Standards, WAC 173-350-300	ARAR	Establishes the requirements for the temporary storage of solid waste in a container onsite and the collecting and transporting of the solid waste.	The substantive requirements of this newly promulgated rule are relevant and appropriate to the onsite collection and temporary storage of solid wastes at the 224-T Facility. Compliance with this regulation is being implemented in phases for existing facilities.
To-Be-Considered pursuant to relevant facility acceptance criteria			
<i>Environmental Restoration Disposal Facility Waste Acceptance Criteria</i> (BHI-00139)	TBC	This document establishes waste acceptance criteria for ERDF.	Waste destined for management at ERDF must meet acceptance criteria to ensure proper disposal.
5.1.2.2 STANDARDS CONTROLLING EMISSIONS TO THE ENVIRONMENT			
Regulations pursuant to the <i>Clean Air Act of 1977</i> , 42 USC 7401, et seq.			
<i>"National Emission Standards for Hazardous Air Pollutants"</i> (40 CFR 61)			
40 CFR 61.92	ARAR	Emissions of radionuclides to the ambient air shall not exceed amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.	Substantive requirements of this standard are applicable because this removal action may include activities such as open-air demolition of contaminated structures, excavation of contaminated soils, and operation of exhausters and vacuums, each of which may provide airborne emissions of radioactive particulates to unrestricted areas. As a result, requirements limiting emissions apply. This is a risk-based standard for the purposes of protecting human health and the environment.

Table 5-1. Identification of Applicable or Relevant and Appropriate Requirements and To Be Considered Information for the 224-T Facility.

ARAR citation	ARAR or TBC	Requirement	Rationale for use
40 CFR 61.93	ARAR	Emissions from point sources of airborne radioactive material shall be measured. Measurement techniques may include, but are not limited to, sampling, calculation, smears, or other methods for identifying emissions as determined by the lead agency and approved by the EPA.	Substantive requirements of this standard are applicable because point source emissions of radionuclides to the ambient air may result from activities performed during the removal action such as open-air demolition of contaminated structures, excavation of contaminated soils, and operation of exhausters and vacuums. This standard exists to assure compliance with emission standards.
40 CFR 61.145(a) 40 CFR 61.145(c) 40 CFR 61.150	ARAR	Regulated asbestos-containing materials shall be removed in accordance with specific handling, packaging, and disposal requirements where the potential to emit asbestos exists.	Substantive requirements of this standard are applicable because this removal action includes abatement of asbestos and asbestos-containing materials in the form of pipe and tank insulation, transit siding, and ductwork. As a result, there is potential to emit asbestos to unrestricted areas and the requirements for the removal, handling, and packaging of asbestos apply.
Regulations pursuant to the <i>Washington Clean Air Act</i> , RCW 70.94 / <i>Department of Ecology</i> , RCW 43.21A			
<i>Radiation Protection - Air Emissions</i> , (WAC 246-247)			
WAC 246-247-040(3) WAC 246-247-040(4)	ARAR	Emissions shall be controlled to assure emission standards are not exceeded.	Substantive requirements of this standard are applicable because fugitive, diffuse, and point source emissions of radionuclides to the ambient air may result from activities performed during the removal action, such as open-air demolition of contaminated structures, excavation of contaminated soils, and operation of exhausters and vacuums. This standard exists to assure compliance with emission standards.
WAC 246-247-075	ARAR	Emissions from non-point and fugitive sources of airborne radioactive material shall be measured. Measurement techniques may include, but are not limited to sampling, calculation, smears, or other method for identifying emissions.	Substantive requirements of this standard are applicable because fugitive and non-point source emissions of radionuclides to the ambient air may result from activities performed during the removal action such as open-air demolition of contaminated structures and excavation of contaminated soils. This standard exists to assure compliance with emission standards.
<i>"General Regulations for Air Pollution,"</i> (WAC 173-400)			
WAC 173-400-040 WAC 173-400-113	ARAR	Methods of control shall be employed to minimize the release of air contaminants associated with fugitive emissions resulting from materials handling, construction, demolition, or other operations. Emissions are to be minimized through application of best available control technology.	Substantive requirements of these standards are applicable to this removal action because there may be visible, particulate, fugitive, and hazardous air emissions and odors resulting from decontamination, demolition, and excavation activities. As a result, standards established for the control and prevention of air pollution may be applicable.

Table 5-1. Identification of Applicable or Relevant and Appropriate Requirements and To Be Considered Information for the 224-T Facility.

ARAR citation	ARAR or TBC	Requirement	Rationale for use
<i>Controls for New Sources of Air Pollution, (WAC 173-460)</i>			
WAC 173-460-030 WAC 173-460-060 WAC 173-460-070	ARAR	Emissions of toxic air contaminants shall be quantified and ambient impacts evaluated. Best available control technology for toxics shall be used.	Substantive requirements of these standards are applicable to this removal action. Because there is the potential for toxic air pollutants to become airborne as a result of decontamination, demolition, and excavation activities. As a result, standards established for the control of toxic air contaminants may be applicable.

5.3 ESTIMATED COSTS

The following is a summary of estimated costs for each removal action alternative, excluding the No Action alternative, evaluated in the EE/CA. The near-term costs for implementing the No Action alternative are negligible as no costs are expended on security, radiological surveys, maintenance activities, etc.; therefore, costs are not included.

The summarized estimate for Alternative Two is shown in Table 5-2, which includes a projection of costs over the S&M period for roof replacement and maintenance. The present-worth (discounted) cost for Alternative Two is approximately \$1,220,000. The total nondiscounted cost for Alternative Two is approximately \$1,670,000. Present-worth costs are used for evaluation of alternatives in the CERCLA process. Actual costs could vary. The total nondiscounted costs are presented only for information and comparison purposes.

Consistent with guidance established by the U.S. Office of Management and Budget (OMB), present-worth analysis is used as the basis for comparing costs of cleanup alternatives under the CERCLA program (OMB 1992). For purposes of this evaluation, present-worth (discounted) cost values are calculated using a discount rate of 3.2% for Alternative Two, 1.9% for Alternative Three, and 2.2% for Alternative Four (Marske 2003; OMB 1992). Note: The difference in the discount rates is due to the difference in time periods to complete the different alternatives.

S&M cleanup actions often incur costs at different times. For example, construction costs (e.g., roof replacement) could be followed by periodic costs in subsequent years or decades to maintain the effectiveness of the remedy. Because of the time-dependent value of money, future expenditures are not considered directly equivalent to current expenditures. The present-worth cost method shows the amount of money required at the initial point in time (e.g., in the current year) to fund all cleanup activities occurring over the life of the alternative. Present-worth analysis assumes that the funding set aside at the initial point in time increases in value as time goes on, similar to how money placed in a savings account gains in value as a result of interest paid on the account. Although the federal government typically does not set aside the money in this manner, the present-worth analysis is specified under CERCLA as the approach for establishing a common baseline to evaluate and compare alternatives that have costs occurring at different times. While the money actually might not be set aside, the present-worth costs are considered directly comparable for the purpose of evaluating alternative costs.

In contrast with the present-worth costs, the total nondiscounted costs do not take into account the value of money over time. The nondiscounted cost method displays the total costs occurring over the entire duration of an alternative, with no adjustment (or discounting) to reflect current year or set aside cost

based on an assumed interest rate. Because nondiscounted costs do not reflect the changing value of funds over time, presentation of this information under CERCLA is for only information purposes, not for alternative selection purposes.

The present-worth (discounted) cost for Alternative Three is approximately \$16,490,000. The total nondiscounted cost (approximately \$16,750,000) is a summation of the D&D costs for the duration of the project and reflects potential long-term costs that have not been discounted to reflect cost in 2003 dollars (present worth).

The present-worth cost for Alternative Four is approximately \$18,330,000. The total nondiscounted cost (approximately \$18,850,000) is a summation of the D&D costs for the duration of the project and reflects potential long-term costs that have not been discounted to reflect cost in 2003 dollars (present worth).

Table 5-2. Total Costs for the 224-T Facility Removal Action Alternatives.

Alternative	Total Cost (\$1,000)	
	Present worth	Nondiscounted
Two – S&M	\$1,220	\$1,670
Three – D&D (excluding building foundation and underlying soils/structures)	\$16,490	\$16,750
Four – D&D (including building foundation underlying soils/structures to 1 meter below foundation)	\$18,330	\$18,850

5.4 PROJECT SCHEDULE

The 224-T Facility removal action is ready to begin July 2005. The project will be completed consistent with Hanford Site priorities and budget. Demolition of the 224-T Facility is expected to be deferred to coincide to the remedial action for the 221-T Canyon Facility.

Before initiating this action, U.S. Department of Energy, Richland Operations Office (DOE-RL) submits this Action Memorandum to Ecology for review and approval. The 224-T Facility waste management plan and removal action work plan will be submitted to Ecology during project activities for review and approval. The 224-T Facility sampling and analysis plan will also be submitted to EPA and Ecology for review and approval.

No transuranic waste is expected to be generated during demolition of the 224-T Facility. Any transuranic waste generated during demolition activities will be shipped to WIPP for final disposition in accordance with an approved work plan and a schedule established for remedial actions, no later than September 30, 2024.

6.0 EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Severe weather can create facility conditions amenable to radiological releases, and long-term aging of engineered controls can lead to eventual failure. These conditions could result in an unplanned release. This may cause a threat to human health and the environment by direct exposure to nearby personnel and the environment, and exposure to the public through airborne radioactive contaminants.

7.0 OUTSTANDING POLICY ISSUES

There are no policy issues associated with this removal action.

8.0 SELECTED ALTERNATIVE

The recommended removal action alternative for the 224-T Facility is Alternative Three: D&D (to grade, excluding building foundation and underlying soils/structures). This alternative would provide the best balance of protecting human health and the environment associated with the hazardous substance inventory within the facility, meeting the removal action objectives, and providing a cost-effective option.

Alternative One does not provide overall protection to human health and the environment. Alternative Two provides adequate overall protection of human health and the environment, but at an increasing cost over time. Additionally, Alternative Two would not remove the radioactive or other hazardous substance inventory within the facility. The risk to human health and the environment from exposure resulting from facility deterioration increases with time. Therefore, neither of these alternatives is selected.

Alternatives Three and Four are judged to be comparable in terms of long-term protectiveness. Removal of the aboveground structure and its inventory of radioactive materials and other hazardous substances substantially reduces the potential exposure threat to human health and the environment. Both Alternatives Three and Four provide comparable protection from potential exposure to radioactive or other hazardous substances that may be present in the building foundation or underlying soils. Alternative Three isolates potential subsurface contamination by leaving the stabilized facility foundation in place. Alternative Four removes the material to a separate approved waste disposal location.

Alternatives Three and Four are both consistent with future remedial actions being considered in the area. The T Plant Area waste sites and pipelines are near and some are directly beneath the 224-T Facility. The recommended removal action is needed to provide access to some waste sites and pipelines for potential subsurface remediation. Alternative Three has somewhat lower costs, has reduced exposure of the workers to industrial hazards, and requires a lesser commitment of additional backfill materials.

Environmental sampling will be conducted in conjunction with, or following, D&D activities to assess whether the removal action objectives have been achieved. This is necessary to ensure that removal action objectives are met for Alternative Three, the selected alternative. A need for follow-on actions will be determined utilizing the steps listed below:

- Implementing the approved sampling and analysis plan (SAP) for samples of the slab and soil surrounding and below the slab. The data quality objectives process will identify the contaminants of concern to be identified in the SAP.
- Obtaining analytical results from samples. Verifying that the quality assurance/quality controls specified in the SAP were met by the laboratory.
- Placing analytical data in the administrative record.
- Comparing analytical results with industrial clean-up standards. These standards will be the same as the standards used for the 200 Area remedial actions.

- If the results are below the industrial clean-up standards, then no further action is necessary under this removal action. Results will be documented in the administrative record through appropriate closure documentation.
- If the results are above industrial clean-up standards, then a work plan addendum to identify follow-on actions will be negotiated between DOE, Ecology and EPA. These actions may include no further action, performing additional removal, or deferring to a later remedial action.

Table 8-1 identifies costs for major activities to be performed as part of implementation of the selected alternative.

Table 8-1. Cost Estimate for Alternative Three: D&D (To Grade, Excluding Building Foundation and Underlying Soils/Structures).

Item	Estimated cost (\$1,000)
Project planning and equipment procurement	\$9,100
Site mobilization and facility upgrades	260
Facility/waste characterization	2,670
Facility demolition	2,990
Waste disposal	
Low-level waste	525
Transuranic waste	755
Project closeout/demobilization	230
Post D&D Surveillance and Maintenance	220
Nondiscounted Grand Total	\$16,750
Present-Worth (Discounted)	\$16,490

This decision document represents the selected removal action alternative as decontamination and demolition of the 224-T Facility based on the evaluation presented in the EE/CA and public comments. This alternative removes the potential for a release of hazardous substances that could pose a threat to public health and the environment, is protective of workers, and minimizes disposal costs. To the extent possible, by removing sources of contamination before a release occurs, this action will contribute to the efficient performance of any long term remedial actions taken in this area. This proposal was developed in accordance with CERCLA, as amended by the *Superfund Amendments and Reauthorization Act* and is not inconsistent with the *National Oil and Hazardous Substance Pollution Prevention Contingency Plan*. This decision is based on the information provided in the Administrative Record for this project.

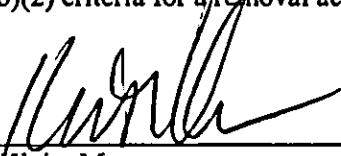
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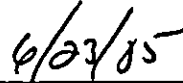
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DOE APPROVAL SIGNATURE

The following signatures pages (Approval-1 of 2) provide documented agreement between the DOE and the EPA for the *ACTION MEMORANDUM FOR NON-TIME-CRITICAL REMOVAL ACTION AT THE 224-T PLUTONIUM CONCENTRATION FACILITY*. Conditions at the site meet the NCP section 300.415(b)(2) criteria for a removal action. The total estimated cost for the project is \$16,490,000.



Keith A. Klein, Manager
Richland Operations Office
U.S. Department of Energy



Date

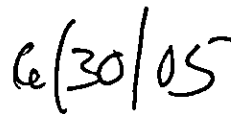
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ECOLOGY APPROVAL SIGNATURE

The following signatures pages (Approval-2 of 2) provide documented agreement between the DOE and the EPA for the *ACTION MEMORANDUM FOR NON-TIME-CRITICAL REMOVAL ACTION AT THE 224-T PLUTONIUM CONCENTRATION FACILITY*. Conditions at the site meet the NCP section 300.415(b)(2) criteria for a removal action. The total estimated cost for the project is \$16,490,000.



Mike A. Wilson, Manager
Hanford Project Office
Washington State Department of Ecology



Date

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